

Illinois River Watershed Modeling Project

- Good morning Administrator Pruitt. My name is Richard Wooster and I serve as Chief of the Assessment, Listing and TMDL Section. I have been associated with the Region's current Illinois River Watershed modeling project since its beginning in 2009, and have been responsible for its supervision since 2011.
- Addressing nutrient-related water quality impairments in the Illinois River Watershed and Lake Tenkiller has long been a priority for the State of Oklahoma and the Cherokee Nation.
- However, meeting the Oklahoma Scenic River phosphorus criterion at the Oklahoma/Arkansas state line may require significant and potentially very costly load reductions from both point and nonpoint sources in Arkansas.
- In addition, even if the Illinois River meets the Scenic River phosphorus criterion as it crosses the state line, it may also be necessary to implement additional load reductions from point and nonpoint sources in Oklahoma.
- Given the intrinsic uncertainties in determining what specific load reductions might be required to meet water quality standards in the river and the lake, and the significant capital investment that might be required to implement those reductions, EPA collaborated with State and Tribal partners to develop 2 water quality models which allow decision-makers to simulate and assess alternative load reduction scenarios.

- The first of these models simulates the fate and transport of phosphorus and other nutrients throughout the watershed based on various load reduction alternatives.
 - Key Model Inputs
 - Meteorological Data (Precipitation, Evapotranspiration, etc.)
 - Streamflow Data (Gauge Measurements)
 - Water Quality Data (Ambient Monitoring)
 - Point Source Discharges (Concentrations and Loads from DMR)
 - Litter and Fertilizer Application Data (Timing and Locations)
 - Soils (Fractionation of Phosphorus, surface vs. at depth)
 - Topography and Elevation
 - Hydrography and Channel Characteristics
 - Land Use
 - Key Model Outputs
 - Phosphorus (and other modeled parameters) concentrations and loads at any time (daily time-step) and location in the watershed. The primary locations of interest have been at the state line and just before Lake Tenkiller.
- The second model simulates the variable water quality conditions in Lake Tenkiller based on alternative watershed load reduction scenarios.
 - Key Model Inputs
 - Phosphorus (and other modeled parameters) concentrations at the closest monitoring location above Lake Tenkiller.
 - Key Model Outputs
 - dissolved oxygen and chlorophyll-a concentrations in Lake Tenkiller

- During the initial phase of model development, Region 6 worked with nationally known water quality modeling consultants to develop draft models for scientific peer review. Based on comments provided by external third-party reviewers, the models were revised and subsequently provided to our State and Tribal partners for their review in the fall of 2015.
- The Region received comments from our partner agencies, and also from consultants representing industry and municipalities in Arkansas.
- To address all the comments received concerning the draft models, the Region established an interagency Technical Workgroup and convened a series of six face-to-face meetings, in addition to several conference calls.
- The Technical Workgroup included technical and management representatives of the Oklahoma DEQ, Water Resources Board, Conservation Commission, and the Department of Agriculture, Food, and Forestry. The Workgroup also included technical and management representatives of the Arkansas Natural Resources Commission (ANRC) and the Arkansas DEQ. The Cherokee Nation Environmental Programs Director also participated in the Workgroup. Finally, at the request of the ANRC, Dr. Brian Haggard from the University of Arkansas participated in the Workgroup.
- Over the course of several months, the Workgroup discussed and implemented several changes in the models which significantly improved their calibration.
- A couple of the key technical questions considered by the Workgroup included: whether the models appropriately reflected hydrologic conditions at all times, including drought periods; and, whether the models appropriately represented the timing and geographic distribution of litter application in the watershed.
- The Technical Workgroup agreed upon a “Baseline Model Run” which can be used to assess impacts and reductions moving forward. The baseline run

uses litter application data for 2009, land cover data for 2011, point source inventory for 2015, discharge monitoring permit limits and flows for 2015, and meteorological data from 1992 through 2009.